DOCUMENT RESUME

ED 067 432 UD 012 933


AUTHOR Rapp, M. L.; Haggart, S. A.

TITLE Evaluation of Project R-3, San Jose, Calif., 1971-72.

INSTITUTION Rand Corp., Santa Monica, Calif.
SPONS AGENCY San Jose Unified School District, Calif.
REPORT NO WN-7910-SJS
PUB DATE Aug 72
NOTE 65p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Compensatory Education Programs; Curriculum Development; *Demonstration Projects; *Diagnostic Teaching; Educationally Disadvantaged; Individualized Instruction; Inservice Teacher Education; Longitudinal Studies; Program Evaluation; Remedial Mathematics; Remedial Reading; *Secondary School Students; Self Concept; Teaching Methods
IDENTIFIERS California; *Project R 3



ABSTRACT

Project R-3 has as its primary objective improving both reading and mathematics skills. The other objectives are to change the self-image of students from one of failure to one of success, and to change their behavior patterns as students by providing them with immediate success experiences. The project started in the spring of 1970 when students were in the second semester of the seventh grade. It included all seventh grade students at one school. In 1970-71, these same students participated as eighth graders, and the 1971-72 program continues the program for these students in the ninth grade. The major components of the ninth grade program are reading, mathematics, studies in advanced simulation, and intensive involvements. Project R-3 was designed jointly by the San Jose Unified School District and the Education Systems organization of Lockheed Missiles and Space Company (now Technicon Education Systems) with the help of consultants from San Jose State College. Project R-3 includes a curriculum that interrelates reading and mathematics with reinforcement through gaming-simulation, intensive involvements (a series of extended field trips), parental involvement, and an in-service training program for staff development. Program students are grouped into heterogeneous classes, each reflecting the achievement range of the entire program population. [For related documents, see ED 049 933, ED 027 136, ED 061 727, and UD 013 011.] (Author/JM)

WN-7910-SJS

August 1972

# EVALUATION OF PROJECT R-3, SAN JOSE, CALIF., 1971-1972

M. L. Rapp and S. A. Haggart

A WORKING NOTE
prepared for the

SAN JOSE UNIFIED SCHOOL DISTRICT



Rand
SANTA MONICA, CA 90406

CONTENTS

## PREFACE

This work represents our final report to the San Jose Unified School District on the evaluation of their demonstration project under the auspices of AB 938. Project R-3 is designed to raise the reading and mathematics achievement of educationally disadvantaged students and is in its third year of operation.

In addition to discussing the cognitive and affective changes which have taken place this year, we present a two year longitudinal analysis of the achievement gains and a documentation of important changes that have taken place during the three years of the project which contribute to its successful operation.

## SUMMARY

Project R-3, based on the philosophy that if a student has the mathematics and reading skills necessary to function at grade level he can succeed in other areas of education and in the world of work, has as its primary objective improving both reading and mathematics skills.

The project started in the spring of 1970 when students were in the second semester of the seventh grade. It included all seventh grade students in one school. In 1970-1971 these same students participated as eighth-graders, and the 1971-1972 program continued for these students in the ninth grade.

The major components in the ninth grade program are reading, mathematics, and R-3 (studies in advanced simulation). Students are grouped into heterogeneous classes, using an objective technique developed for the project by Rand. Each class reflects the achievement range of the entire program population and has an approximately equal distribution of boys and girls. Each class of twenty students has a teacher and an instructional aide. In both reading and mathematics students pursue an individual progress program using contracts based on extensive diagnostic-prescriptive information.

Other important components of the project that have contributed to its overall success are intensive involvements, parental involvement, home visits, and an on-going in-service training component.

This year overall achievement gain for the students was 1.35 years in reading and .8 in mathematics. The average *expected* gain for these students for one year is .61 in reading and .67 in mathematics. Two year gains for those students for whom we have complete data were 2.65 years in reading and 1.76 in mathematics. In both subjects the two-year gain is significantly different at or beyond the .001 level from expected gains.

In an effort to solve the problem of using control groups or previous historical data we derived a two-year expectancy gain for each student in each subject, using his entering pre-test score as the

basis. In order to show the data visually we constructed achievement idiographs for each subject. It is possible from the idiographs to quickly ascertain which individuals are making better than expected gains, which less than expected gains. It provides the project management and the teachers with a useful tool for project improvement.

Student non-cognitive measures are discussed, as are other project components. The following instructional procedures seem to have contributed heavily to the success of the project:

- o heterogeneous grouping that forces individualized instruction
- o the diagnostic-prescriptive approach that ensures that each student follows a continuous progress program geared to his needs
- o the writing of performance objectives that clarified goals for both teachers and students
- o continuous curriculum modification based on an analysis of the previous year's achievement results
- o intensive in-service training for the staff aimed at constantly improving the program

Changes were made during the course of the project. These changes are described. Most were internal changes instituted in response to perceived needs and directed toward strengthening the program. Other changes were external in that they were responses to events outside the project that had an impact on the project.

In past years many improvements to the project have been a result of suggestions made by the staff. These were often expressed during the interviews we periodically have with staff members. This year the interviews focused on the aspects of the program that the staff feels are essential to its success, and gives districts interested in replication the additional insights necessary for successful implementation.

The dissemination and replication activities of the project are discussed in some detail. Dissemination is explicit requirements of the State Department of Education for all demonstration projects.

Recommendations are made about: ways to facilitate achievement

gain, priorities for admission to programs like Project R-3, the benefits of heterogeneous grouping, the merit of continuing the home visits, and a continuing in-service training program geared to program improvement. We also suggested some considerations that might be helpful in designing the nature and scope of the intensive involvements. We recommended a reassessment of the qualifications of instructional aides. Finally, we suggested that the project director might reorganize his staff to include a curriculum specialist in lieu of an assistant director. The net effect of such a charge would be to concentrate more resources on program improvement.

# I. PROJECT R-3 DESCRIPTION

## OBJECTIVES OF PROJECT R-3

Project R-3 is based on the philosophy that if a student has the mathematics and reading skills necessary to function at grade level, then not only can he succeed in other areas of education but also he can succeed in the world of work. Based on this philosophy, Project R-3 has as its objective improving both reading and mathematics skills.

The other objectives of Project R-3 are to change the self-image of students from one of failure to one of success, and to change their behavior patterns as students by providing them with immediate success experiences.

The project started in the spring of 1970 when students were in the second semester of the seventh grade. It included all seventh grade students at one school.

In 1970-71 these same students participated as eighth graders, and the 1971-72 program continues the program for these students in the ninth grade. A majority of the students exhibited some, or all, of the following characteristics:

- o Poor performance on standardized tests
- o Classroom performance significantly below grade level
- o Low level in verbal functioning
- o Negative attitude toward school and education
- o Low occupational and educational aspiration level
- o Expectations of school failure
- o High absentee rate

## THE NATURE OF PROJECT R-3

The major components of the ninth grade program are reading, mathematics, R-3 (studies in advanced simulation) and intensive involvements. Project R-3 was designed jointly by the San Jose Unified School District and the Education Systems organization of Lockheed Missiles and Space Company (now Technicon Education Systems) with the help of consultants from San Jose State College.

Project R-3 includes a curriculum that interrelates reading and mathematics with reinforcement through gaming/simulation, intensive involvements (a series of extended field trips), parental involvement and an in-service training program for staff development.

There is no evidence that partial use of project materials will achieve the same results. The reinforcing nature of the R-3 component would strongly indicate that it could be successfully combined with other reading and mathematics courses. In addition, many of the gaming/simulations can be used in any classroom to teach or reinforce specific concepts or skills. Each gaming/simulation activity or exercise states its behavioral objectives.

The main objective of Project R-3 is the upgrading of essential reading and mathematics skills. By deeply involving the students in classroom games and simulations, the program seeks to motivate them to achieve in learning experiences--to make them *ready* to learn, to make learning *relevant*, and to *reinforce* positive attitudes and behavior.

Program students are grouped into heterogeneous classes, using an objective technique developed by The Rand Corporation. Each class reflects the achievement range of the entire program population and has an equal distribution of boys and girls. As a result, those students with social or behavior problems are distributed among all the classes. In addition, heterogeneous grouping provides successful peer models for the underachievers.

## RESOURCES NEEDED

With the exception of the materials developed for the R-3 component, the intensive involvements and some of the mathematics contracts, the project makes use of commercially available materials. A wide variety of audio-visual equipment is used--overhead, film, and slide projector; tape recorders; language masters; listening post; microphones; videotape cameras, monitors, and recording consoles; calculators and typewriters. The audio-visual materials include videotapes of lessons and trips, tape-recorded materials such as guest lectures, slides and films.

The materials and equipment used in Project R-3 are of secondary importance to the motivational components. Any available standard, published materials, especially those emphasizing individualized instruction, can be adapted to teach subject matter strands of reading and mathematics.

Minimal remodeling of classroom space was done to improve the environment and to add the necessary electrical outlets. Flexible conference-type tables and stacking chairs replaced conventional furnishings.

## PERSONNEL

Personnel for the program include the director, the assistant director and the instructional staff. The instructional staff of Project R-3 consists of regular district teachers who were given a short period of pre-service training and continuous in-service training, and instructional aides. A desirable, but not necessary, criterion for selecting instructional aides from the community was an ability to speak Spanish.

Although Project R-3 operates with a teacher and an instructional aide assigned to a classroom of twenty students, there is no evidence to support this ratio as a prerequisite. In fact, most of the project staff have indicated that a higher student-adult ratio would be feasible.

## OPERATIONAL PROCEDURES

Each program student participates in a three-period core of reading, mathematics, and R-3 (studies in advanced simulation). Social studies, physical education, and one elective subject comprise the remainder of the students' program and are taken with the other ninth grade students.

In both reading and mathematics classes, emphasis is placed on individualized instruction to meet the special needs of each student. Program personnel estimate that 70 percent of the classwork is done in an individualized learning situation and the other 30 percent in small groups of from two to seven students.

The reading component of Project R-3 utilizes a diagnostic/prescriptive approach in a reading laboratory situation. The mathematics component uses a diagnostic/prescriptive approach as well as discovery techniques and multi-sensory inputs. Each student is on an individual progress program in both reading and mathematics. Relevance to the students' world is stressed. The R-3 component uses a series of motivational materials including gaming/simulations and intensive involvements--extended field trips of two or three days' duration. As mentioned earlier, the R-3 component is the focus of the program, utilizing and reinforcing the skills and concepts learned in the reading and mathematics components.

An intensive involvement is a series of learning experiences built around a particular theme, and including one or more gaming/simulation activities. These two or three day intensive involvements require that students and project staff travel to a locale suitable to the activities. The highly structured student-teacher relationship is supplanted by a much freer atmosphere. Learning experiences conducted outdoors and away from class schedules and period bells help to promote this different educational environment. After the return from an intensive involvement, classroom activities build on the experiences of the students.

The parental involvement of Project R-3 focuses on drawing parents and students together. Every effort is made to involve parents in all phases of the project, and regular home visitation by project staff is an important component. Parents are invited to visit classrooms and observe and participate in learning activities; Spanish-speaking personnel are available to assist them at the school. Parents are encouraged to go on study trips and to the intensive involvement sites. Dinner meetings for parents, students, and program personnel are held periodically in the school cafeteria to review progress to date and plans for the future. Parents who are unable to attend are sent a newsletter about the meeting, one copy in English and one in Spanish.

Project R-3 in-service training is conducted during the first period of the school day. The staff utilizes this time for three periods a week for group meetings to coordinate activities, discuss common problems, share ideas, and plan ways to tie the major components of Project R-3 together. In addition, the R-3 program teachers who teach the same subject also meet for the other two periods a week to plan special activities for their classes. Other meetings and workshops are held as needed. For example, because work on R-3 curriculum was needed, a workshop was held for three weeks during the summer. Six of the program teachers and an industry research specialist participated in developing the curriculum for the program.

## II. ACHIEVEMENT RESULTS, 1971-1972

As in previous years students were assigned to heterogeneous classroom groups in an objective fashion, that is on the basis of test scores alone. Each group is so constituted as to reflect the range of pre-test achievement scores obtained by the entire project. This procedure has been described at length in a previous evaluation report.*

Form R, Level 3 of the California Test of Basic Skills was used as the pre-test in October 1971 and the post-test in June 1972. Scores are reported only for those students who took both the pre-test and the post-test. Tables 1 and 2 present the data in terms of grade equivalents; tables 3 and 4 in expanded standard scores, the reporting form required by the Bureau of Evaluation and Research, Division of Compensatory Education.

Table 1

GRADE EQUIVALENT SCORES: READING

| | Pre-test | | | Post-test | | | Gain |
|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. | |
| Reading | 120 | | | 120 | | | |
| Vocab. | | 6.41 | 2.22 | | 7.89 | 2.65 | 1.48 |
| Compre. | | 5.98 | 2.43 | | 7.16 | 2.80 | 1.18 |
| Total | | 6.23 | 2.27 | | 7.58 | 2.63 | 1.35 |

Table 2

GRADE EQUIVALENT SCORES: MATH

| | Pre-test | | | Post-test | | | Gain |
|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. | |
| Math | 115 | | | 115 | | | |
| Comput. | | 6.38 | 2.27 | | 7.38 | 2.14 | 1.00 |
| Concepts | | 6.67 | 2.54 | | 7.34 | 2.56 | .67 |
| Applic. | | 6.18 | 2.58 | | 6.61 | 2.90 | .43 |
| Total | | 6.41 | 2.29 | | 7.21 | 2.33 | .80 |

*Rapp, M. L., et. al. *Project R-3, San Jose, Calif: Evaluation of Results and Development of a Cost Model*, R-672-SJS, March 1971.

Table 3

EXPANDED STANDARD SCORES: READING

| | Pre-test | | | Post-test | | | Gain |
|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. | |
| Reading | 120 | | | 120 | | | |
| Vocab. | | 475.15 | 80.10 | | 526.51 | 91.46 | 51.36 |
| Compre. | | 472.99 | 81.59 | | 511.36 | 89.66 | 48.37 |
| Total | | 469.11 | 79.90 | | 516.56 | 91.08 | 47.45 |

Table 4

EXPANDED STANDARD SCORES: MATH

| | Pre-test | | | Post-test | | | Gain |
|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. | |
| Math | 115 | | | 115 | | | |
| Comput. | | 460.15 | 83.75 | | 498.66 | 72.65 | 38.51 |
| Concepts | | 476.77 | 89.00 | | 498.88 | 90.14 | 22.11 |
| Applic. | | 465.94 | 95.76 | | 475.26 | 110.58 | 9.32 |
| Total | | 461.18 | 84.26 | | 491.42 | 81.74 | 30.48 |

The gain in reading is in itself very creditable, but even more so when contrasted with last year. Last year overall gain was 0.9; this year it is 1.35. The math gain is disappointing, and, unlike reading, reflects a drop from last year. In 1970-71 math gains were 1.0; in 1971-72, .8. These results will be more fully discussed in connection with the other analyses of project achievement.

## RESULTS BY SEPTILE

Tables 5 and 6 report the scores by septile for reading and math, respectively. As was the practice in previous reports, the pre-test scores are arranged in descending order from the highest to the lowest, and are divided into seven groups. These groups form the basis for the allocation of students to heterogeneous classrooms. It should be emphasized that students are *not* grouped into classrooms by their septile rankings. Septiles do, however, form a meaningful basis for detailed analysis of the achievement of groups of students within the project.

Table 5

SEPTILE SCORES 1971-1972

Reading Gains

| Septile | Vocabulary | | | Comprehension | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain |
| 1* | 9.77 | 11.37 | 1.6 | 10.16 | 11.21 | 1.0 | 10.09 | 11.47 | 1.4 |
| 2 | 8.25 | 10.09 | 1.8 | 7.51 | 9.25 | 1.7 | 7.93 | 9.68 | 1.7 |
| 3 | 7.11 | 8.89 | 1.8 | 6.50 | 8.03 | 1.5 | 6.89 | 8.48 | 1.6 |
| 4 | 5.85 | 6.98 | 1.1 | 5.54 | 6.39 | .8 | 5.78 | 6.71 | .9 |
| 5 | 5.76 | 7.41 | 1.6 | 4.36 | 6.17 | 1.8 | 5.08 | 6.87 | 1.8 |
| 6 | 4.24 | 5.43 | 1.2 | 4.06 | 4.54 | .5 | 4.16 | 5.01 | .8 |
| 7 | 3.49 | 4.72 | 1.2 | 3.21 | 4.12 | .9 | 3.19 | 4.43 | 1.2 |

Table 6

SEPTILE SCORES 1971-1972

Math Gains

| Septile | Computation | | | Concepts | | | Applications | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain |
| 1* | 10.00 | 10.41 | .4 | 10.51 | 10.74 | .2 | 10.11 | 10.12 | .1 | 10.22 | 10.53 | .3 |
| 2 | 8.04 | 8.87 | .8 | 8.51 | 8.88 | .4 | 8.05 | 8.71 | .7 | 8.17 | 8.95 | .8 |
| 3 | 6.88 | 7.97 | 1.1 | 6.56 | 8.03 | 1.5 | 6.70 | 6.97 | .3 | 6.85 | 7.81 | 1.0 |
| 4 | 5.68 | 6.57 | .9 | 6.65 | 6.93 | .3 | 5.69 | 6.30 | .6 | 5.88 | 6.55 | .7 |
| 5 | 5.13 | 6.14 | 1.0 | 5.51 | 6.15 | .6 | 4.49 | 4.63 | .1 | 5.05 | 5.79 | .7 |
| 6 | 4.45 | 5.66 | 1.2 | 4.63 | 5.33 | .7 | 4.11 | 4.62 | .5 | 4.40 | 5.29 | .9 |
| 7 | 3.63 | 5.30 | 1.7 | 3.64 | 4.53 | .9 | 3.23 | 4.15 | .9 | 3.41 | 4.73 | 1.3 |

*Highest scores on pre-test.

In reading, all but Septiles 4 and 6 gained better than a year in eight months of instruction on the total score. All Septiles gained better than a year on the vocabulary sub-test, and all but 4, 6 and 7 gained better than a year on the comprehension sub-test.

In math, only Septiles 3 and 7 gained a year or more on the total score. Gains of over a year were obtained in all Septiles except 1, 2 and 4 on the computation sub-test. In contrast, only Septile 3 made a year's gain on the concepts sub-test, and no Septile made a year's gain on the application.

If we contrast these results with those obtained last year, what we see is a reading program that has gained momentum and improved greatly, and a math program that has lost the momentum it built last year. Tables 7 and 8 contrast last year's with this year's gains for reading and math.

Table 7

READING GAINS BY SEPTILE 1970-1971, 1971-1972

| Septile | Vocabulary | | Comprehension | | Total | |
|---|---|---|---|---|---|---|
| | 1970-71 | 1971-72 | 1970-71 | 1971-72 | 1970-71 | 1971-72 |
| 1 | 0.6 | 1.6 | 1.3 | 1.0 | 0.9 | 1.4 |
| 2 | 0.9 | 1.8 | 1.2 | 1.7 | 0.9 | 1.7 |
| 3 | 0.6 | 1.8 | 1.4 | 1.5 | 1.0 | 1.6 |
| 4 | 0.4 | 1.1 | 1.2 | 0.8 | 0.9 | 0.9 |
| 5 | 1.0 | 1.6 | 0.4 | 1.8 | 0.8 | 1.8 |
| 6 | 0.7 | 1.2 | 0.6 | 0.5 | 0.7 | 0.8 |
| 7 | 1.2 | 1.2 | 0.6 | 0.9 | 1.0 | 1.2 |

Table 8

MATH GAINS BY SEPTILE 1970-1971, 1971-1972

| Septile | Computation | | Concepts | | Application | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 1970-71 | 1971-72 | 1970-71 | 1971-72 | 1970-71 | 1971-72 | 1970-71 | 1971-72 |
| 1 | 1.3 | 0.4 | 1.6 | 0.2 | 1.2 | 0.1 | 1.4 | 0.3 |
| 2 | 1.3 | 0.8 | 1.1 | 0.4 | 0.9 | 0.7 | 1.2 | 0.8 |
| 3 | 0.9 | 1.1 | 1.3 | 1.5 | 0.9 | 0.3 | 1.0 | 1.0 |
| 4 | 0.3 | 0.9 | 1.3 | 0.3 | 1.0 | 0.6 | 0.7 | 0.7 |
| 5 | 0.3 | 1.0 | 1.0 | 0.6 | 0.7 | 0.1 | 0.5 | 0.7 |
| 6 | 0.7 | 1.2 | 1.3 | 0.7 | 1.0 | 0.5 | 0.9 | 0.9 |
| 7 | 1.2 | 1.7 | 0.7 | 0.9 | 0.7 | 0.9 | 1.0 | 1.3 |

Gains and Losses by Septile

Last year we presented a breakdown for each septile showing the number of students in each septile who gained or lost and a recomputed gain or loss score for each separate group. Project management found this a useful analysis because it high-lighted those areas of the curriculum most in need of attention and revision. We therefore have included the same analysis for this year's achievement data, presented in Table 9 for reading, and Table 10 for math. Of the 120 students

who took both the reading pre- and post-tests, 107, or 88 percent gained. Of the 115 students who took both the math pre- and post-tests, 91, or 79 percent gained. As measured by these tests, the project is reaching a large percent of the population for whom it is designed.

Table 9

GAINS AND LOSSES BY SEPTILE IN READING 1971-1972

| Septile | Vocabulary | | | Comprehension | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | All | Gain | Loss | All | Gain | Loss | All | Gain | Loss |
| 1 | 1.6 | 1.9 | -.2 | 1.0 | 1.9 | -1.2 | 1.4 | 1.8 | -.6 |
| (N) | (19) | (16) | (2) | (19) | (12) | (3) | (19) | (15) | (1) |
| 2 | 1.8 | 1.8 | -- | 1.7 | 2.2 | -.6 | 1.7 | 1.7 | --- |
| (N) | (15) | (15) | (0) | (15) | (12) | (1) | (15) | (15) | (0) |
| 3 | 1.8 | 2.3 | -1.1 | 1.5 | 2.0 | -.9 | 1.6 | 1.8 | -1.1 |
| (N) | (17) | (14) | (2) | (17) | (14) | (2) | (17) | (16) | (1) |
| 4 | 1.1 | 1.6 | -.6 | .8 | 1.8 | -.8 | .9 | 1.2 | -.4 |
| (N) | (20) | (16) | (4) | (20) | (12) | (6) | (20) | (16) | (4) |
| 5 | 1.6 | 2.0 | -1.5 | 1.8 | 2.3 | -.6 | 1.8 | 2.2 | -.3 |
| (N) | (17) | (15) | (1) | (17) | (14) | (3) | (17) | (14) | (3) |
| 6 | 1.2 | 1.5 | -1.3 | .5 | 1.2 | -.8 | .8 | 1.3 | -.7 |
| (N) | (16) | (14) | (2) | (16) | (10) | (5) | (16) | (11) | (1) |
| 7 | 1.2 | 1.7 | -1.1 | .9 | 1.3 | -.6 | 1.2 | 1.7 | -.6 |
| (N) | (16) | (13) | (2) | (16) | (13) | (3) | (16) | (13) | (3) |

Table 10

GAINS AND LOSSES BY SEPTILE IN MATH, 1971-1972

| Septile | Computation | | | Concepts | | | Application | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | Gain | Loss | All | Gain | Loss | All | Gain | Loss | All | Gain | Loss |
| 1 | .4 | 1.3 | -1.5 | .2 | 1.7 | -2.2 | .1 | 2.0 | -2.3 | .3 | 1.2 | -1.4 |
| (N) | (19) | (12) | (5) | (19) | (9) | (5) | (19) | (7) | (6) | (19) | (11) | (5) |
| 2 | .8 | 1.3 | -1.2 | .4 | 1.8 | -1.1 | .7 | 3.0 | -1.8 | .8 | 1.5 | -1.3 |
| (N) | (15) | (12) | (3) | (15) | (7) | (6) | (15) | (7) | (6) | (15) | (11) | (4) |
| 3 | 1.1 | 1.8 | -.6 | 1.5 | 2.1 | -1.6 | .3 | 1.1 | -1.1 | 1.0 | 1.4 | -.4 |
| (N) | (19) | (13) | (5) | (19) | (15) | (2) | (19) | (11) | (6) | (19) | (14) | (5) |
| 4 | .9 | 1.2 | -.5 | .3 | 1.1 | -1.4 | .6 | 1.9 | -1.3 | .7 | 1.0 | -.8 |
| (N) | (15) | (12) | (3) | (15) | (9) | (4) | (15) | (9) | (6) | (15) | (12) | (3) |
| 5 | 1.0 | 1.4 | -.4 | .6 | 1.1 | -.9 | .1 | 1.3 | -1.8 | .7 | 1.0 | -.2 |
| (N) | (15) | (11) | (2) | (15) | (11) | (3) | (15) | (8) | (5) | (15) | (12) | (3) |
| 6 | 1.2 | 1.5 | -1.0 | .7 | 1.4 | -1.3 | .5 | 1.0 | -.7 | .9 | 1.0 | -.2 |
| (N) | (17) | (15) | (2) | (17) | (12) | (4) | (17) | (11) | (4) | (17) | (15) | (2) |
| 7 | 1.7 | 1.8 | -.9 | .9 | 1.5 | -.8 | .9 | 1.9 | -1.2 | 1.3 | 1.6 | -.4 |
| (N) | (15) | (14) | (1) | (15) | (11) | (4) | (15) | (9) | (3) | (15) | (13) | (2) |

We would like to call attention to Septiles 4 and 6 in reading comprehension as having higher loss-gain ratios than other groups, and being most in need of curriculum revision. They account for 11 of the 23 losses in Comprehension. At the same time, we would point out that Septile 4, vocabulary and Septile 5 comprehension which showed the highest loss-gain ratios last year, have improved considerably this year.

In math, Septile 2, concepts, and Septiles 1 and 2 application show the highest loss-gain ratios this year. The two that showed the highest loss-gain ratios last year, Septiles 4 and 5 in computation, showed good gains this year. The lack of substantial progress in the highest septiles is cause for concern, as is the fact that 28 students lost ground in concepts and 35 in application.

The discussion of shifts in grade-level distributions is included in the section on the longitudinal study.

THE "TURN-ONS"

During the course of this academic year, and well before the results of the achievement tests were available, the English teachers felt the reading program would be successful this year because the students were turned on. When the project director asked them to what characteristics of the students they were responding, the teachers said the students:

- o have found success to be sweet
- o have regained lost self-confidence
- o are realizing the value of study and applying themselves
- o are in a group that enjoys working
- o are happier with their peers; free to express themselves
- o are more accepting of school values and their own worth
- o felt no threat of failure
- o enjoyed the contract system as self-motivating
- o found the materials challenging and interesting to work with

Before the achievement tests had been scored, the teachers submitted to the director a list of 37 students whom they characterized

as turned on. The student identifier code used throughout the project was substituted for the names and the list was then made available to us.

We computed the mean gain of the "turned-on" students and compared it with that of the other 84 students. The turned-on group had a mean gain of 2.05 on the total reading score; the other students showed a mean gain of 1.05. A t-test on the difference between these means is significant at the .001 level.

Perhaps the fact that the teachers were able to identify these students has an implication for future projects. By, in effect, allowing the teacher to view herself as a manager of learning experiences, she uses to good advantage the constant feedback about student progress inherent in an individualized program. Most important, once the teachers are convinced that a student is self-motivated it should take less effort on the teacher's part to keep them going, and free the teacher to concentrate more attention on getting the rest of the class turned on.

## III. TWO YEAR LONGITUDINAL STUDY

### EXPECTANCY SCORES

One of the problems that has plagued the evaluation of compensatory programs has been establishing the significance of obtained achievement gains. Traditional design calls for random assignment of students to experimental and control groups. But compensatory education is designed to meet the specific needs of identified groups of students. Therefore, it is inappropriate to randomly assign students to treatments or non-treatment groups. Even if a control group were available outside the program, the assumption of randomization that lies behind the tests of statistical significance most commonly used is violated. In addition, it is often difficult, if not impossible, to find a group of comparable students who are receiving a "pure", traditional education.

A solution often used is to rely on historical data and to measure the effect of some treatment against the results achieved with like groups of students in previous years who did not receive special programs. Average gains for these groups can be used as an expectancy prediction of future gains by like groups if they receive no special treatment. Standardized tests are normed to show ten months growth for an instructional year. Compensatory programs generally deal with a population gaining from four to seven months in a ten-month instructional year. Therefore, if a treatment raises that gain to an average of ten months, we can attribute the additional gain to the treatment with a reasonable degree of confidence.

We have used a form of expectancy data that is derived from data about each of the students participating in the program. We make the assumption that a student's pre-test given before the special program starts represents the average rate of gain he has made during his previous years of schooling. Since we are dealing with an entering eighth-grade population (the first year of a two-year program) we divide the entering grade-equivalent score for each student by eight to obtain his average rate of gain over the previous years (K through 7)

he has been in school. We then assume that with no special treatment he will continue to make the same average gain in future years. If there is a difference between his expected gain and his achieved gain at the end of the program it seems reasonable to attribute that difference to the effect of the program in which he was participating. A t-test on the difference between the expected and observed means can be used to determine whether the difference is significant.

We would be cautious about using this measure in the first two or three grades because there would not be sufficient opportunity for random variations in learning rate to average out. While we do not assume a constant rate of gain over the years for an individual student, we consider the average rate of gain over the past years to be a reasonable predictor of the average gain during the next two years. We are also assuming that a child had a year of kindergarten since the expected score for a large population entering first grade is 1.0.

Furthermore, in this particular case we are probably overestimating the expected gains for these students. They were in the program for the second semester of the seventh-grade; many made almost a year's gain in the four months between the pre- and post-tests. Achievement tests were changed at the start of the eighth grade in order to conform to state guidelines. This, of course, precludes longitudinal analysis over the full life of the project.

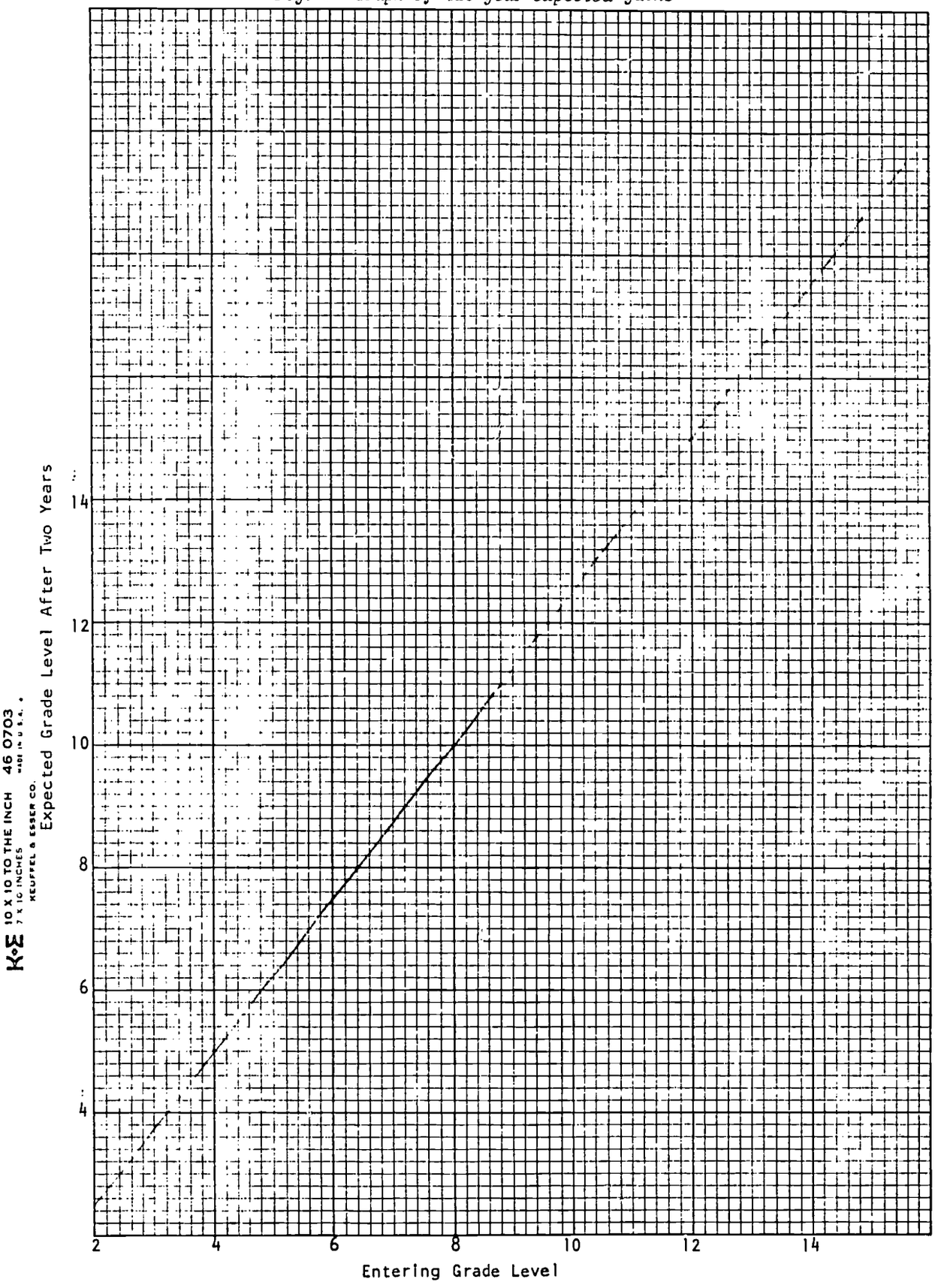
Since the relationship between entering achievement score and expected gain is linear, it is easy to construct a *two-year expected gain* graph using the formula:

$$\text{expected gain} = \frac{\text{entering score}}{8} \times 2$$

The entering score is read off the x axis, and the expected score at the end of two years off the y axis. An alternative, of course, would be to construct a table of expected scores using the same formula. The graph we used is shown as Fig. 1.

There were 113 students for whom we had eighth-grade (Oct. 1970) pre-tests and ninth-grade (June 1972) post-tests in both reading and

*Fig. 1--Graph of two year expected gains*



mathematics. For each student we computed an average gain over the past eight years. Based on this, an expected two-year gain for each student in each subject was derived. Tables 11 and 12 show expected and observed two-year gains for reading and mathematics, respectively.

Table 11

EXPECTED AND OBSERVED TWO-YEAR GAINS IN READING

| | | Expected | Observed |
|---|---|---|---|
| | Losses | 0* | 6 |
| Months Gained | 1-5 | 3 | 5 |
| | 6-10 | 48 | 8 |
| | 11-15 | 38 | 9 |
| | 16-20 | 15 | 15 |
| | 21-25 | 8 | 8 |
| | 26-30 | 1 | 12 |
| | 31-35 | 0 | 18 |
| | 36-40 | 0 | 13 |
| | 41-45 | 0 | 9 |
| | 46-50 | 0 | 5 |
| | 51-55 | 0 | 4 |
| | 56-60 | 0 | 1 |

*It is an artifact of the process for estimating expected gain that no losses can be predicted

Table 12

EXPECTED AND OBSERVED TWO-YEAR GAINS IN MATH

| | | Expected | Observed |
|---|---|---|---|
| | Losses | 0 | 4 |
| Months Gained | 1-5 | 1 | 12 |
| | 6-10 | 34 | 17 |
| | 11-15 | 43 | 22 |
| | 16-20 | 26 | 13 |
| | 21-25 | 8 | 18 |
| | 26-30 | 1 | 9 |
| | 31-35 | 0 | 11 |
| | 36-40 | 0 | 3 |
| | 41-45 | 0 | 3 |
| | 46-50 | 0 | 0 |
| | 51-55 | 0 | 0 |
| | 56-60 | 0 | 1 |

Table 13 summarizes the expectancy data.

Table 13

SUMMARY EXPECTANCY DATA

| | Expected Gain | Observed Gain |
|---|---|---|
| Reading | 1.23 | 2.60 |
| Math | 1.35 | 1.74 |

A t-test was done on each set of scores, reading and math. For reading, the difference is significant well beyond not only the .001 level, but beyond any tabulated significance level. For math, the difference is significant at the .001 level.

We consider this to be good evidence that both programs made real changes in the rate of achievement gain for the program students.

## ACHIEVEMENT IDIOGRAPHS

In order to visually display these data, we constructed the achievement idiographs shown in Figs. 2 and 3. The x axis shows individual students. The y axis shows grade levels. The idiograph shows the pre-test grade level, the expected gain and the post-test grade level. It is possible at a quick glance to ascertain the individual students who are making better than expected gains, or less than expected gains. The achievement idiograph also provides a means of obtaining a quick count of students at or above any given grade level for either the pre- or post-test. More important, perhaps, is that it provides the project management and the teachers with a useful tool for project improvement. If names were attached to each student's record, the measure of success for individuals could be seen. This information could be used for planning individualized programs for each student. If he is progressing well, perhaps no changes are needed. If he is progressing at the expected no-treatment level, or only slightly better than expected, perhaps a change in his instructional program is indicated.

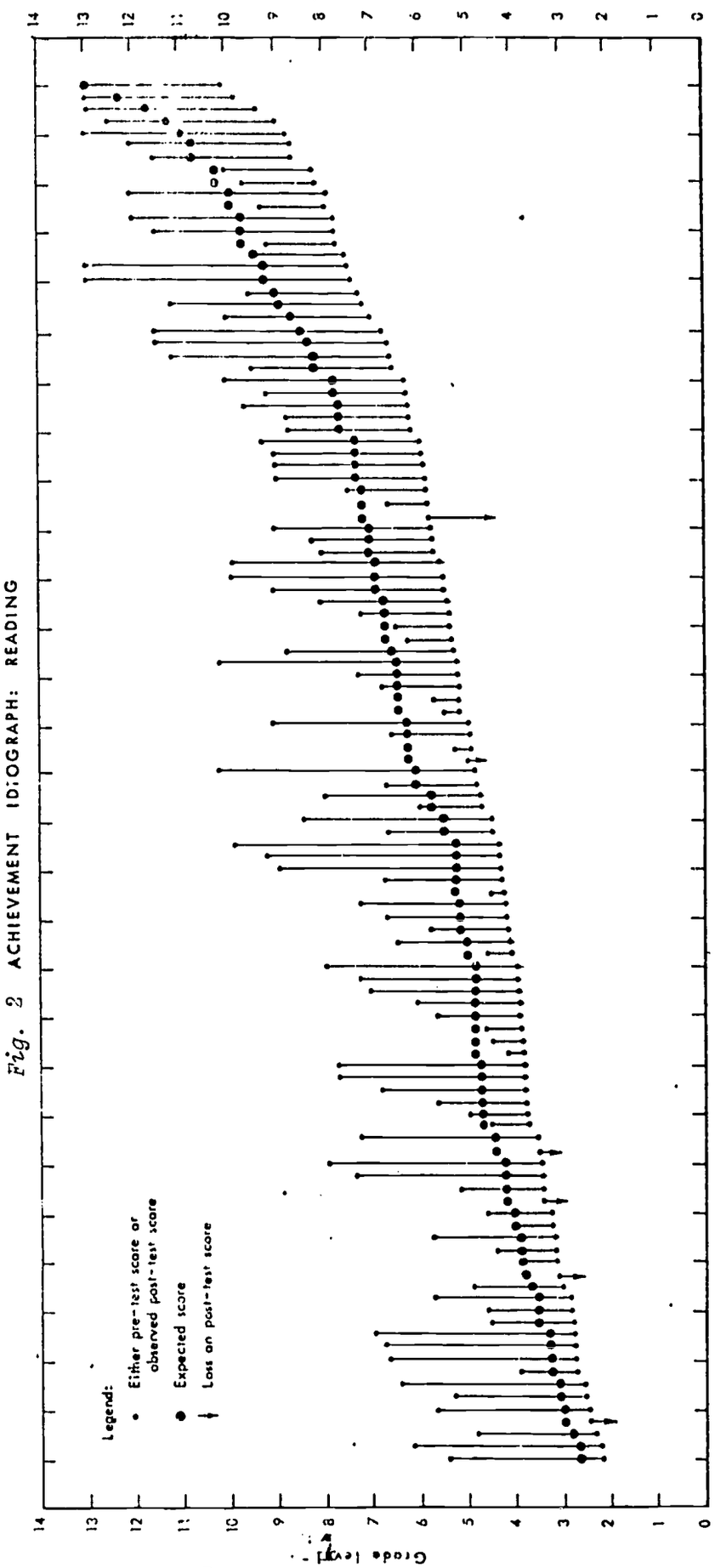



*Fig. 2* ACHIEVEMENT IDIOGRAPH: READING

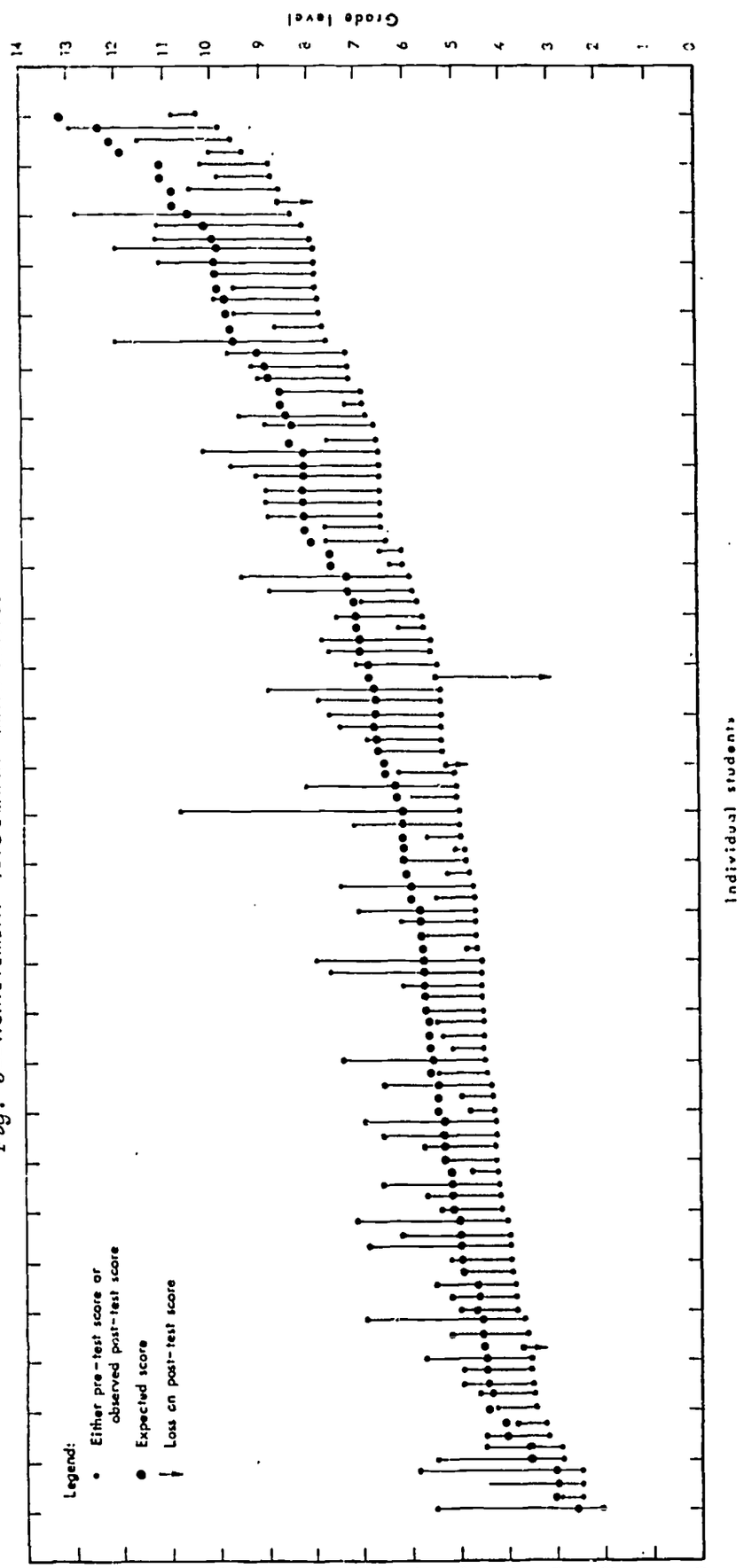



*Fig. 3--ACHIEVEMENT IDIOGRAPH: MATHEMATICS*

## TWO-YEAR ACHIEVEMENT DATA

So far we have only discussed student gains in relation to their expected gains. Here we present the actual results of the pre- and post-tests. Minor discrepancies between these data and those just discussed are due to different sample size. In the expectancy data, the sample was 113 students for whom we had a 1970-pre-test and a 1972 post-test. For the results shown in Table 14, the sample was 100 students in reading and 99 in math for whom we had two complete sets of data, i.e. pre- and post-tests 1970-71, and pre- and post-tests 1971-72.

Table 14

TWO YEAR ACHIEVEMENT RESULTS

| | Pre-test 1970 | | | Post-test 1972 | | | Gain |
|---|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. | |
| Reading | 100 | | | 100 | | | |
| Vocab. | | 5.22 | 2.02 | | 8.07 | 2.61 | 2.85 |
| Compre. | | 4.79 | 1.89 | | 7.15 | 2.83 | 2.36 |
| Total | | 5.00 | 1.85 | | 7.65 | 2.63 | 2.65 |
| Math | 99 | | | 99 | | | |
| Comput. | | 5.61 | 1.80 | | 7.36 | 2.15 | 1.75 |
| Concepts | | 5.31 | 2.08 | | 7.25 | 2.47 | 1.94 |
| Applic. | | 5.20 | 2.15 | | 7.45 | 2.79 | 1.25 |
| Total | | 5.37 | 1.82 | | 7.13 | 2.27 | 1.76 |

As we have done in each annual report, we also present these data broken down by septile for each subject. Table 15 shows the results for reading and Table 16 for math.

Table 15

TWO YEAR ACHIEVEMENT RESULTS BY SEPTILE IN READING

| Septile | Vocabulary | | | Comprehension | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain |
| 1 | 8.26 | 11.39 | 3.13 | 8.31 | 11.38 | 3.07 | 8.28 | 11.56 | 3.28 |
| 2 | 6.88 | 10.85 | 3.97 | 6.01 | 9.14 | 3.13 | 6.52 | 10.00 | 3.48 |
| 3 | 6.08 | 7.96 | 1.88 | 4.96 | 7.56 | 2.60 | 5.58 | 7.80 | 2.22 |
| 4 | 5.71 | 7.63 | 1.92 | 4.06 | 6.71 | 2.65 | 4.87 | 7.21 | 2.34 |
| 5 | 3.76 | 6.91 | 3.15 | 4.04 | 6.13 | 2.09 | 3.96 | 6.57 | 2.61 |
| 6 | 3.45 | 6.11 | 2.66 | 3.51 | 4.95 | 1.44 | 3.44 | 5.49 | 2.05 |
| 7 | 2.79 | 6.11 | 3.32 | 2.80 | 4.45 | 1.65 | 2.59 | 5.32 | 2.73 |

Table 16

TWO YEAR ACHIEVEMENT RESULTS BY SEPTILE IN MATH

| Septile | Computation | | | Concepts | | | Applications | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain | Pre | Post | Gain |
| 1 | 8.52 | 10.62 | 2.10 | 8.81 | 10.59 | 1.78 | 8.39 | 10.32 | 1.93 | 8.49 | 10.57 | 2.08 |
| 2 | 6.66 | 8.97 | 2.31 | 6.72 | 8.88 | 2.16 | 6.69 | 7.95 | 1.26 | 6.71 | 8.78 | 2.07 |
| 3 | 5.75 | 7.42 | 1.67 | 5.36 | 7.35 | 1.99 | 5.42 | 6.18 | 1.76 | 5.50 | 7.18 | 1.68 |
| 4 | 5.31 | 6.34 | 1.03 | 4.32 | 6.60 | 2.28 | 4.60 | 5.98 | 1.38 | 4.84 | 6.29 | 1.45 |
| 5 | 4.64 | 6.18 | 1.54 | 4.35 | 6.08 | 1.73 | 3.85 | 5.17 | 1.32 | 4.37 | 5.94 | 1.57 |
| 6 | 4.34 | 6.04 | 1.70 | 3.59 | 5.86 | 2.27 | 3.34 | 4.49 | 1.15 | 3.85 | 5.59 | 1.74 |
| 7 | 3.20 | 5.20 | 2.00 | 3.10 | 4.47 | 1.37 | 3.44 | 4.08 | .64 | 2.93 | 4.68 | 1.75 |

We have used septiles in achievement analysis for two reasons. First, so that we may assess the impact of the program on students who enter at vastly different achievement levels. It must be remembered that the entire seventh grade at one junior high school was the original population of this project. Their beginning achievement scores in both subjects ranged from second to tenth grade level. Second, so that we may determine whether one group may account for a disproportionate share of the achievement gain.

As would be predicted from their pre-tests, the greatest gains in both reading and math were made by the top two septiles. In order to more fully answer the question of achieving at expectancy level, we computed the expectancy scores for each septile. The achievement levels we present for these septiles are different from those in the previous tables because of the sample size discrepancy we discussed earlier. In reading, all septiles achieved better than would have been predicted. In four of the septiles, the observed gain was better than twice the expected, and in the lowest septile it was four times greater. In math, only the lowest septile doubled its expected gain, and in both the first and third septiles the observed gains were less than the expected gains. The data are shown in Tables 17 and 18.

Table 17

EXPECTED AND OBSERVED GAINS BY SEPTILE IN READING

| Septile | N | Expected | Observed |
|---|---|---|---|
| 1 | 19 | 2.10 | 3.17 |
| 2 | 14 | 1.50 | 3.47 |
| 3 | 18 | 1.30 | 2.32 |
| 4 | 14 | 1.10 | 2.78 |
| 5 | 15 | .95 | 1.95 |
| 6 | 17 | .83 | 2.05 |
| 7 | 16 | .61 | 2.52 |

Table 18

EXPECTED AND OBSERVED GAINS BY SEPTILE IN MATH

| Septile | N | Expected | Observed |
|---|---|---|---|
| 1 | 17 | 2.14 | 2.05 |
| 2 | 15 | 1.71 | 2.25 |
| 3 | 14 | 1.46 | 1.33 |
| 4 | 16 | 1.25 | 1.76 |
| 5 | 14 | 1.10 | 1.49 |
| 6 | 18 | 1.00 | 1.70 |
| 7 | 19 | .80 | 1.61 |

While the expectancy data presented previously can be used to improve the instructional program for individuals, the septile data can be used to improve the instructional program for sub-groups of the project.

## GRADE-LEVEL ANALYSIS

An upward shift in the distribution of scores is one way in which a project's success can be measured. We therefore present the percentage of students at each grade level on the 1970 pre-test, the 1971 pre-test and on the 1972 post-test for reading and for math. These data will be found in Tables 19 and 20. In 1970, less than eight percent of the students were at the entering eighth grade level; in 1972, 18.6 percent of the students were at or above the tenth grade in reading. In math, in 1970, 8.8 percent of the students were at eighth grade level, and in 1972 12.3 percent were at the tenth grade level. Cumulative distributions for both sets of pre- and post-tests are shown in Figs. 4 and 5. It can readily be seen that reading gains

were greater in 1971-72; math made better gains in 1970-71.

There is a second use to which the analysis of grade levels can be put. It is an important piece of information for the decision-maker in terms of planning how many sections of a subject he will need to provide. Certainly students below grade level should be provided with remedial courses. In California where eighth grade competency is required for high-school graduation, it is imperative that the proportion of students in need of remedial work be known.

Table 19

PERCENTAGE OF STUDENTS AT EACH GRADE LEVEL: READING

| Grade | 1970 Pre-Test | 1971 Pre-Test | 1972 Post-test |
|---|---|---|---|
| 12 | 0 | 3.3 | 6.2 |
| 11 | 0 | 1.6 | 8.0 |
| 10 | .9 | 2.5 | 4.4 |
| 9 | 2.6 | 5.8 | 15.0 |
| 8 | 4.4 | 9.9 | 8.8 |
| 7 | 8.8 | 13.2 | 11.5 |
| 6 | 8.8 | 14.0 | 15.0 |
| 5 | 20.4 | 18.2 | 11.5 |
| 4 | 17.7 | 14.0 | 14.3 |
| 3 | 24.0 | 15.0 | 3.5 |
| 2 | 12.4 | 25.0 | 1.8 |

Table 20

PERCENTAGE OF STUDENTS AT EACH GRADE LEVEL: MATH

| Grade | 1970 Pre-Test | 1971 Pre-Test | 1972 Post-Test |
|---|---|---|---|
| 12 | 0 | 3.4 | 3.5 |
| 11 | 0 | .8 | 3.5 |
| 10 | .9 | 4.3 | 5.3 |
| 9 | 2.6 | 6.8 | 10.7 |
| 8 | 5.3 | 9.4 | 8.8 |
| 7 | 10.6 | 11.1 | 15.1 |
| 6 | 13.3 | 15.3 | 15.1 |
| 5 | 16.7 | 15.3 | 22.1 |
| 4 | 31.0 | 23.1 | 12.4 |
| 3 | 14.3 | 7.8 | 2.6 |
| 2 | 5.3 | 2.7 | .9 |

*Fig. 4--Cumulative percentage of students at each grade level: Reading*

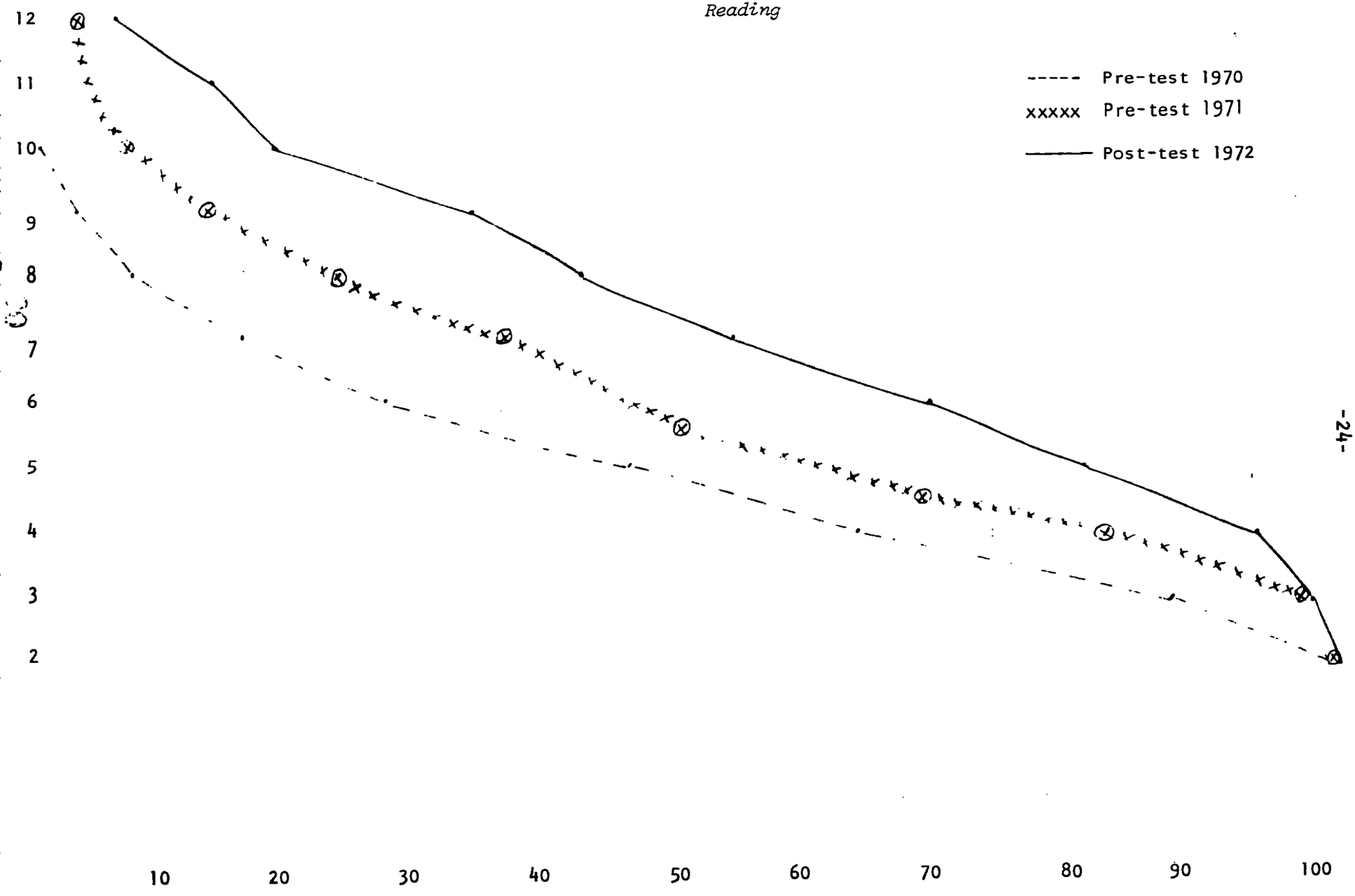
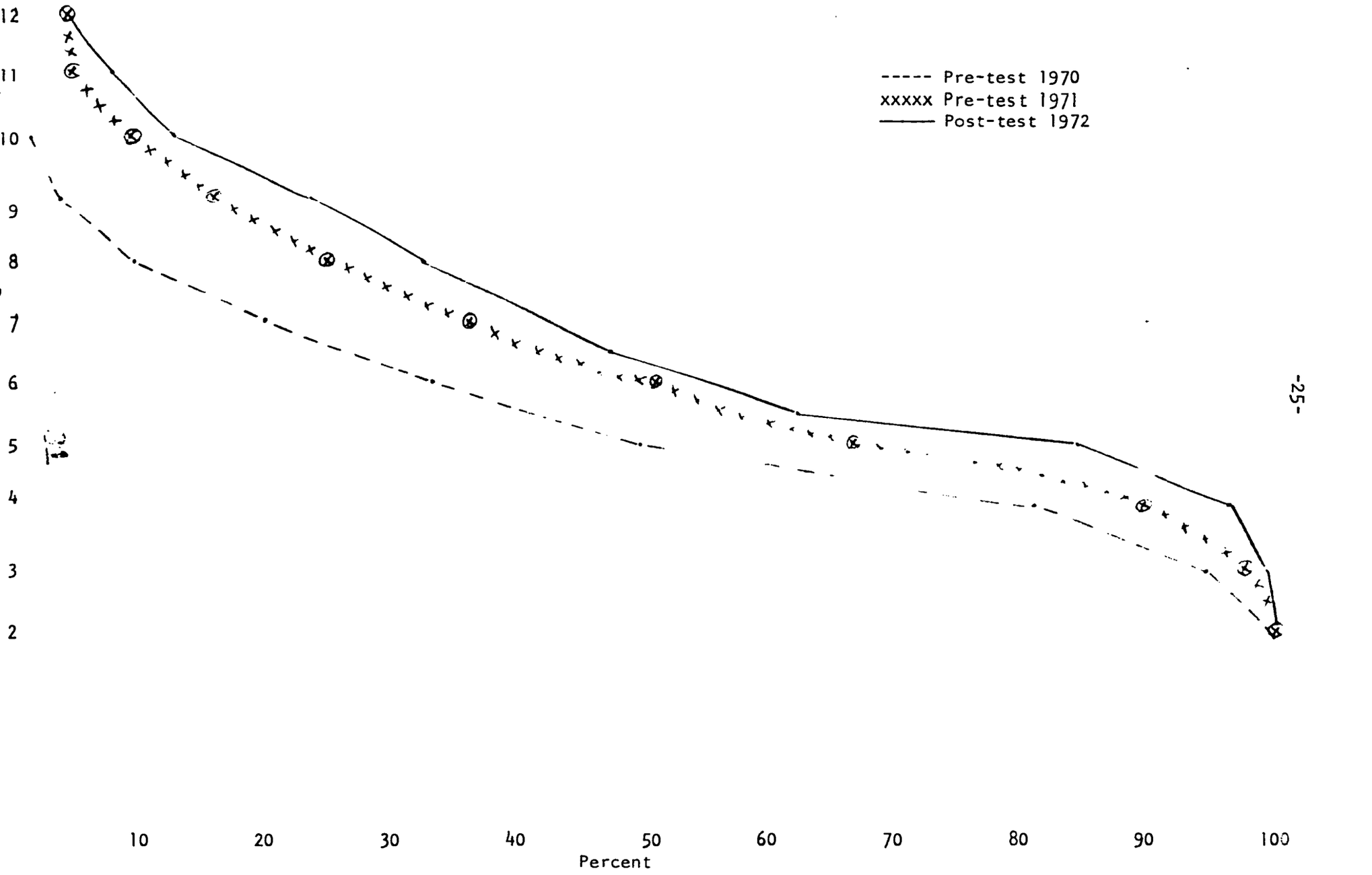


*Fig. 5--Cumulative percentage of students at each grade level: Math*



## IV. NON-COGNITIVE MEASURES

### STUDENT SELF-CONCEPT

In February of 1970 when the program began, we administered Coopersmith's Self-Esteem Inventory (SEI) to all participants. We again administered it in May, 1972 toward the end of the project. There are 58 items on the SEI, including eight items which constitute a Lie Scale. The other fifty yield a Total Score (when multiplied by 2) and five sub-scores: General (26 items), Social-peers (8), Home-parents (8) and School-academic (8). The Lie Scale gives an indication of the defensiveness of the person answering the Inventory. This particular instrument was chosen because we felt that the reading level of the items was low enough to use with a group that had many poor readers. For a complete description of the Inventory the reader is referred to "The Antecedents of Self-Esteem" by Stanley Coopersmith (W. H. Freeman, San Francisco, 1967).

Fifty-four boys and 48 girls who took the Inventory in 1970 again completed it in 1972. In general, total scores for the boys declined slightly during the course of the project, while those of the girls increased slightly. Since there were differences in the scores of boys and girls, scores are presented for each group, rather than for the entire project. We present the data in Table 21.

Table 21

RESULTS OF SELF-ESTEEM INVENTORY ADMINISTERED IN 1970 AND 1972

| Scale (Possible score) | Boys (54) | | Girls (48) | |
|---|---|---|---|---|
| | 1970 | 1972 | 1970 | 1972 |
| Total (100) | 59.44 | 59.07 | 57.50 | 57.92 |
| General (26) | 15.76 | 16.39 | 15.66 | 16.21 |
| Social-peers (8) | 4.98 | 5.09 | 5.12 | 5.89 |
| Home-parents (8) | 4.92 | 4.52 | 4.48 | 4.02 |
| School-academic (8) | 4.39 | 3.98 | 4.46 | 3.62 |
| Lie (8) | 2.76 | 2.52 | 2.77 | 3.04 |

While it is interesting to note the differences on the sub-scales, the eight items of each sub-scale are so few that the reliability of

the sub-scale data is open to serious question. On the General Scale, however, which has 26 items, both boys and girls increased their scores slightly.

The results are certainly difficult to interpret. There is no clear-cut pattern that permits firm conclusions to be drawn. One would certainly have hoped that the School-academic Scale had shown a dramatic improvement. Yet we hesitate to attribute the drop in that scale to the effects of the project.

Students are in classes with the rest of the school for half the day and we do not know with any certainty to what stimuli they are responding when they answer the questions on the Inventory. One of the teachers in whose class the inventory was administered was checking over the papers to make sure they had been properly done, and was shocked at the large number of positive responses to "My teacher makes me feel I'm not good enough". She spoke to some of the students about this later and they all said that it was some other teacher not in the project. Perhaps this Inventory should only be used in self-contained classrooms to minimize the ambiguity.

It is also possible that their self-expectations are higher now and that the drop in scores represents a decrease in their satisfaction with their own performance. In addition, there are so many other influences on the students that it is difficult to know what outside events are shaping their self-concept. One should, perhaps use an Inventory of 25-30 items all dealing with school factors and try to assess only one facet of a student's self-image if the purpose is to see what impact a demonstration project has on self-image.

We contrasted the scores made on the Inventory in 1970 of 56 boys and 57 girls who subsequently left the project, with those who remained. These data are presented in Table 22.

Table 22

1970 SCORES ON SELF-ESTEEM OF STUDENTS WHO STAYED IN PROJECT AND THOSE WHO SUBSEQUENTLY LEFT

| Scale (Possible Score) | Boys | | Girls | |
|---|---|---|---|---|
| | Stayed | Left | Stayed | Left |
| Total (100) | 59.44 | 58.03 | 57.50 | 56.23 |
| General (26) | 15.76 | 14.75 | 15.66 | 14.79 |
| Social-peers (8) | 4.98 | 4.73 | 5.12 | 5.18 |
| Home-parents (8) | 4.92 | 4.95 | 4.48 | 3.84 |
| School-academic (8) | 4.39 | 3.64 | 4.46 | 4.12 |
| Lie (8) | 2.76 | 2.59 | 2.77 | 2.58 |

On almost all scales those who left the project had scores that were lower than the scores of those who stayed. One can't help wonder whether these were the students most in need of improved self-concept, and whether, had they stayed, their scores would have been raised. At the same time we have no normative data for the population we are considering, and therefore no way of assessing the meaning of the scores.

After we heard about the students identified as "turn-ons" we decided to see if there was a difference between their scores and those of the other project participants. We, therefore, averaged their scores separately. Their scores followed the same pattern as those of the other project participants, but on the whole they both started and ended with higher scores. Since the scores of these students who were experiencing academic success also declined on the School-academic scale, the notion that their aspirations were higher at the end of the project is supported. The data follow in Table 23.

Table 23

1970 AND 1972 SCORES ON SELF-ESTEEM INVENTORY FOR "TURNED ON" BOYS AND GIRLS

| Scale (Possible Score) | Girls 1970 | Girls 1972 | Boys 1970 | Boys 1972 |
|---|---|---|---|---|
| Total (100) | 63.08 | 60.61 | 61.12 | 60.75 |
| General (26) | 16.31 | 16.15 | 16.12 | 16.19 |
| Social-peers (8) | 5.38 | 5.69 | 5.44 | 5.38 |
| Home-parents (8) | 5.00 | 4.38 | 4.75 | 4.75 |
| School-academic (8) | 4.69 | 3.85 | 4.50 | 4.19 |
| Lie (8) | 2.85 | 3.85 | 3.00 | 2.19 |

## BEHAVIORAL CHARACTERISTICS AS REPORTED BY TEACHERS

Last year we reported on the changes observed by teachers over the course of the instructional year. It was our intent to repeat the same procedure this year, but a mix-up in the rating forms makes it impossible to use the same format. In 1970-71, the Fall rating asked teachers to describe their students, and the Spring rating asked them to explain any observed *changes* in behavior and attitude. We were then able to tabulate the kinds of changes teachers reported. This year, the teachers were given the same rating scale in both Fall and Spring, i.e., to *describe* their students. There were too few teachers who voluntarily reported change for us to do a meaningful analysis. However, of those changes that were reported, seventy-three in all, eighty-six percent were in a positive direction.

## V. OTHER PROJECT COMPONENTS

### HOME VISITS

Ever since the inception of the project, teachers have routinely made at least two visits to the home of each student participating in the project. The objectives of the home visit component are multiple:

- o To establish and maintain lines of communication with the families
- o To inform the parents of the purposes of the program and how it is implemented
- o To secure home cooperation in dealing with student-related problems
- o To invite the parents to participate in activities especially planned for them
- o To encourage parents to visit their childrens' classrooms
- o To answer questions parents may have about the program
- o To discuss student progress with parents

The project staff has always been enthusiastic about this program component. They feel that it really is an example of home and school working together on behalf of the students.

This year two visits were made to every family, one in the Fall and one in the Spring. The main purpose of the first one was to acquaint the parents with the way in which the project would operate at the high school, and to answer questions. The second, in the Spring was to obtain parental permission for students to go on the intensive involvement, and to invite the parents to the pre-involvement site visit and to a planned open-house at the project.

In the Fall there were seven families with whom no appointment could be arranged, either in their homes, or if that was not convenient, at school. In the Spring, only three families were not seen. Of all the reports on the visits, there was only one in the Fall that described the parents as "negative about school and uninterested in the visit" and one in the Spring where the family attitude was "uncommunicative". At all other times, project personnel were cordially and warmly received, and the visits were termed "highly successful".

We quote a few excerpts from teacher reports of the visits:

> There is a good rapport established between this family and the school. They really feel we are interested and trying to do something to help.
>
> The mother was grateful that we visited. She showed concern about her son, and asked questions about the school bus and warning slips.
>
> The mother was concerned with her son's performance in school. She was not aware that there is homework almost every night and said she would see to it that it was done.
>
> As I left they thanked me genuinely, as if they were totally relieved to know that someone would help them.
>
> They asked me to call immediately if any problems arose.
>
> His parents are very concerned about his behavior and are anxious that we contact them if he has any problems at school.
>
> Her mother would like continuing reports from her teachers and is very impressed with our cut program.
>
> The mother was receptive and cooperative and expressed much more interest than she had indicated on a previous visit.
>
> His mother is aware of his problems and welcomes our support of her in trying to help her son. She wanted to be notified of any rule infractions.
>
> She was delighted with the opportunity to participate in school activities.
>
> The mother will go on the parent trip. This is a breakthrough because she would not get involved previously.
>
> We feel that as a result of our visit the parents have a better understanding of what is happening in the project.
>
> The parents are pleased with the program and are very happy that we are showing so much interest in their daughter.

We had asked the teachers if the home-visit program had accomplished its objectives and therefore is no longer necessary. The unanimous answer was "no". They felt that in many cases it had taken several visits to really reach the parents and to convince them that the project really cared about their children. They also felt

that the continuing nature of the visits was changing parental attitude toward the school and constantly building more cooperation.

Much of the credit for the success of the cut program was given to the fact that rapport had been established with the parents through the home visits.

## THE CUT PROGRAM

Last year the project instituted a procedure to try to mitigate the cutting problem. Instead of having attendance taken only once a day during homeroom, attendance was taken at the beginning of every period the students were in a project class. If it was established that a student was cutting, and not home ill, his parents were immediately called. While this did not have much effect on the chronic cutters, it did serve to lessen the number of students who tried to cut just for the fun of it. It wasn't worth it to them when they were confronted by irate parents at home.

It seems doubly important that such a program be carried out in a project housed on a senior-high school campus. Students having their first experience with an open-campus, where they are free to leave the grounds without challenge, are likely to try cutting. If they get away with it the first time, and perhaps a second and third time, they can easily drift into the ranks of truants. If, on the other hand, the first time they try it they realize they can't really get away with it, it will act as a strong deterrent to another attempt.

## THE INTENSIVE INVOLVEMENTS

We have discussed the intensive involvements in great detail in past years. This year, it was, according to project personnel, again an outstanding event. It took place at Monterey and the theme was *The United States Coast Guard as a Public Service Agency*. According to the director, the intensive involvement study trip:

- Is the reinforcing phase of the year's work
- Is the final incentive unit
- Is a learning experience built around a single theme

- o Promotes freer student-teacher relationships
- o Creates an unstructured educational environment
- o Provides for highly concentrated learning
- o Makes extensive use of hands-on activities
- o Promotes the use of multi-sensory inputs for learning
- o Encourages students to assume leadership roles
- o Facilitates peer tutoring
- o Teaches students the value of team efforts

Our discussions with the staff this year and in the past and our own observations at many involvements have convinced us that the above statement is an accurate description of the rationale for an intensive involvement.

The involvements have been highly rated throughout the course of the demonstration project. Students have enjoyed them and benefitted from them; staff has found them an excellent way of establishing good rapport with students. What their contribution to the academic success of the project is remains an unanswerable question. Lacking objective data about a project similar in all other respects, but without an intensive involvement, we have always relied on the opinion of the professionals involved in the project. They feel that the intensive involvements, by breaking down barriers between them and their students, have facilitated academic achievement.

## VI. INSTRUCTIONAL PROCEDURES CONTRIBUTING TO SUCCESS

Several procedures seem to contribute heavily to the success of the project. Certainly any district wishing to replicate R-3 could not hope to achieve the same results without adopting the strategies that the director and staff consider to have been the primary reasons for their success in raising student achievement. In this section we will briefly describe the instructional strategies that contribute to project success, giving, where appropriate, staff reasons why they consider them to be of prime importance.

### HETEROGENEOUS GROUPING

When the State funded the demonstration projects under AB 938 one of the guidelines was that students would be heterogeneously grouped. These projects were designed to follow all the students in a grade level for three years: seventh, eighth and ninth grades. In order to insure that students would not be tracked according to ability, heterogeneous grouping was mandated. Two distinct benefits accrued to the project: it forced the individualization of instruction because there was such a wide spread of achievement level in the classroom, and it changed the social composition of the classroom.

The teachers have told us about the following positive results:

- Strong leaders are available for discussions
- Students tend to reinforce each other's good behavior
- An able student can be put in charge of a small group to help them
- Because some students work more independently there is time to help others
- A good student can be held up as a model for the others
- Students get a chance to mix with a variety of ability levels; it is a true to life situation
- Some students are reached better by their peers than by a teacher
- Competition is self-generated; students will try to catch up with another one
- An atmosphere of cooperation is created in the classroom
- Students learn the difference between copying and helping

The teachers are quick to acknowledge that you cannot have heterogeneous grouping without individualization of instruction. While this is difficult and time-consuming they feel that it is the basis for the good achievement gains made by the project students. The basis for the individualization of instruction is the diagnostic-prescriptive approach used by the project staff.

## DIAGNOSTIC-PRESCRIPTIVE APPROACH

The reading component of the project will serve as an example of how the diagnostic-prescriptive approach is implemented. In math, the approach is basically the same. Each student is on an individual progress schedule which has been determined by a series of diagnostic instruments:

- o Item-analysis of the CTBS
- o Gates Reading (group test)
- o McCall Crabbs (individual test)
- o Gray Oral Reading Test (individual)
- o Spache Reading Inventory (individual)
- o Reading for Understanding Placement Test (group)
- o Wide-Range Reading Test (individual)

The results of these instruments are used to construct a prescription for each student in each of the major categories of reading development:

- o Comprehension
- o Skill areas
- o Vocabulary
- o Reading habits

A separate contract, designed to overcome identified deficiencies and contribute to his progress, is then drawn between the teacher and each student. In addition, all objectives are stated in behavioral terms so that a student's progress can be realistically measured.

One of the serendipitous effects of individualizing instruction is that it does away with the perennial teaching problem of determining

the proper amount of structure in the classroom. Some students need a highly structured situation in which to achieve; others thrive only in a non-structured situation. The combination of the diagnostic-prescriptive approach and the use of contracts lets each student choose the amount of structure most comfortable for him. Some check every bit of work with the teacher before going on to the next task; others work straight through a contract without seeking help or even trying to find out if they are on the right track. The teacher takes this information about the student into consideration in writing his subsequent contracts.

Finally, the individualized approach based on the student's diagnosed needs permits great flexibility in selecting the appropriate tasks for the student. If one set of materials isn't right for him, the teacher can experiment until she finds the materials that are both of interest to the student and geared to his developmental level.

## PERFORMANCE OBJECTIVES

All three of the instructional components in the project have written their own performance objectives. Their use in the R-3 component (now officially called Studies in Advanced Simulation) is of particular interest.

We quote from an internal project document excerpts showing how performance objectives met an instructional need.

> Near the end of the first quarter, it came to our attention in one of our in-service rap sessions that there might be a breakdown in communications between S.A.S. students and teachers....The trouble seems to lie in the students'...inability to understand the purpose of S.A.S. and the learning outcomes....It seemed easy for the students to understand how they learned and what they learned in reading and math, but not the subtle reinforcing learnings in S.A.S....A series of in-service meetings was set up to attack the problem and seek a solution. A questionnaire was administered to the students that... substantiated our feelings. Two solutions were decided upon: teacher objectives will be made understandable...to the students...and unit tests will be prepared.

This illustrates simultaneously the changing nature of the project and the value of continuous in-service training. (Both are discussed later.)

Not only were the learning objectives specified in detail, which helped the teachers structure their presentations, but the students were given the list of objectives at the start of each unit. This enabled them to understand the purpose of the activities. They began to think of their participation in the simulation component of the project as a learning situation and not as a fun-and-games period. It is a little ironic that when students engage in activities that are fun, and play games that simulate real-life situations, they tend to scorn the period as not being school work, and have to be told constantly not only that they are learning, but specifically what they are learning. After unit tests were instituted the students felt they were benefitting from the S.A.S. component.

## CURRICULUM MODIFICATION

No program that is truly individualized can remain static for long because no two individuals have the identical set of needs. During the course of the year the teacher is constantly trying new materials and new approaches in an attempt to reach each student.

It is nevertheless important to assess whether the program is effective for all groups of students, or perhaps only for some. While it is obvious to the teacher during the course of the year that individual students are achieving well, the question of whether progress is relatively even throughout the classroom (or program) must be addressed. We have previously discussed, in the chapter on achievement analysis, the use of septiles to assess the progress of students who were at different achievement levels at the beginning of the year. Septile analysis also provides the basis for curriculum improvement and modification.

As an example, the evaluation last year showed unusually high ratios of losses to gains for students in two septiles in reading, and in two septiles in math. The teachers were able to pull the

project records on all the students involved, analyze what techniques and materials had been used with those groups of students, and determine why they had not been effective. Based on that set of information, they were able to revamp the curriculum to better meet the needs of the students. This year, those septiles showed low ratios of losses to gains.

We do not find it contradictory to talk of individualized instruction and at the same time discuss the progress of groups of students. Students making the same score on a *sub-test* of an achievement test may have a common set of problems. The solution to those problems can be tailored to individual differences, but directed at overcoming a common deficiency.

## IN-SERVICE TRAINING

During the course of the school year in-service training sessions were an integral part of the operational plan. Sixty-eight sessions were conducted for the project staff, largely by the project director. These sessions were over and above the time devoted to instructional team planning.

In addition to the rap sessions and behavioral objectives workshops to be discussed later there were eleven sessions for the entire staff:

- o One each on orientation, attendance, the cut program and internal budgetary procedures.
- o Four sessions on testing procedures
- o Three dealing with curriculum development

There was an in-service training session for the instructional aides that dealt with their duties and responsibilities. Five rap sessions were held at which only the aides and the project director were present.

Fifteen sessions were held for the S.A.S. teachers:

- o Four dealt with the materials written by Technicon
- o Two were on curriculum planning
- o One preceded the intensive involvement
- o Eight were devoted to the writing of behavioral objectives for S.A.S.

Seven sessions were held for the math teachers:

- o Planning instructional units
- o Instructional materials
- o Four were devoted to developing contracts
- o The math teachers attended a State math conference workshop

Twelve sessions were held for the reading teachers:

- o Instructional materials
- o Testing
- o Contracts
- o Behavioral objectives
- o Three on curriculum development
- o The reading teachers attended a local reading conference workshop
- o They visited two other AB 938 projects, the American Reading Center and Scholastic Book Services

We have presented these activities in some detail because they represent the efforts of an on-going project to meet the needs of students as they arise, and to constantly seek ways of improving the instructional program.

## VII. THE EVOLUTIONARY NATURE OF PROJECT R-3

It is generally accepted that a demonstration program should not remain static. As a program progresses, it becomes evident that, no matter how thorough the planning, there are stumbling-blocks in the implementation. Rather than continue in a less than satisfactory fashion, it makes more sense to correct the problems as they are identified. In addition, many new ideas occur to the staff as the program progresses, which, if implemented, can lead to program improvement. Some of the changes that occur can be described as internal, because they arise from the nature of the specific project. Other-changes would be called external because they are in response to external conditions beyond the control of the project. In this section we discuss the more important internal and external changes that have occured since the inception of Project R-3.

### INTERNAL CHANGES

#### Writing Behavioral Objectives

As the project progressed the director perceived a need for more accurate prescriptions for students' individual curricula. At the same time, the S.A.S. teachers were concerned about the students' lack of understanding of the learnings that were taking place during the simulation period. A solution to both problems was to write behavioral objectives for all components of the project.

Five workshops were conducted by the director for the entire staff, using materials previously developed at Monterey Penninsula College for San Jose Unified School District. One additional session was held with the reading teachers and eight with the S.A.S. teachers. More effort was needed in the S.A.S. component because not only were objectives being written to help the teachers, but the same objectives were then rephrased in language that would be easily understood by the students.

Teachers as Specialists

In the seventh grade, students were with one teacher for a block of three subjects, math, reading and gaming-simulation. The periods were not necessarily contiguous, but more often than not, a student was with the same teacher for at least two periods in a row.

This was felt by the entire staff to be an unsatisfactory arrangement for several reasons:

- o It was difficult to get a class to shift gears from one subject to another when they were in the same room with the same teacher.
- o The burden of preparation on the teacher was considerable--three different subjects, one of them completely new material (simulation)
- o If a student did not like his teacher, he might turn off in all areas, instead of only one
- o The situation was too much like elementary school and the students did not like it

The solution was to have a group of teachers who taught each of the three subjects exclusively. Students and teachers alike were much happier with the new arrangement. It was implemented in the eighth grade and continued in the ninth grade.

Common-time for In-service

Having each teacher responsible for only one subject facilitated the development of a schedule that gave teachers of the same subject a common period for in-service training. Not only did it make it possible for the director to meet with them as a group, rather than individually, but it gave the teachers an opportunity to plan together, and to discuss problems they had encountered. Not only were the other teachers often able to help one of their colleagues in solving a problem, but often a teacher was able to avoid a mistake that would otherwise have been made.

The rap sessions of the past year were to some extent an extension of the common free-time for a group of teachers to the entire project staff.

Rap Sessions

The project staff share a large work-room where they normally go between classes to prepare lessons, grade papers, or discuss problems with their instructional aides or other teachers. As a rule, teachers of one subject talked more to the other teachers of the same subject than to project staff who taught another subject. It has been true that since the beginning of the project communication among teachers of the same subject was better than communication across disciplines.

The director was able to use this natural communication as a means for enlarging the communication network within the project. At a regular in-service meeting which was attended by all teachers and instructional aides, some problems common to all the staff were discussed. The response was so good that rap sessions became a regular part of the staff in-service training component. Sixteen such sessions were conducted during the course of the past instructional year. All the staff agreed that they had been very helpful. A teacher having a problem with a student in reading, for example, was able to discuss the problem with that student's math and S.A.S. teachers and with their instructional aides, to find out how they handled him. A math teacher was able to discuss with a student's reading teacher the techniques she used to overcome the student's dislike of reading. These are only illustrative of the kinds of exchange that took place at these sessions. Suggestions for project improvement were a natural outgrowth of the rap sessions.

Trade-off Between Field Trips and Intensive Involvements

When AB 938 projects were funded to include all the participants in a grade-level, the level of funding was approximately the same as it had been for the demonstration projects funded under SB 28. The larger number of students meant that many adjustments had to be made from the original projects. Under SB 28, Project R-3 had a student body of about forty. A field trip meant one bus for the entire project. With four times that many students, each trip had to be made four times. This puts a strain on the sites being visited, and on

the project staff that must continually adjust to having one or two teachers on a trip, with the consequent need to cover their classes.

The project was faced with having to give up either the field trips or the intensive involvement, because doing both for so large a number of students was too expensive. They opted to reduce the number of field trips from fourteen to two, and to concentrate their resources on one intensive involvement at the end of the school year. Reducing the number of field trips represents a significant departure from the original program which relied heavily on them as part of the motivational component. If the achievement results of the past two years are an acceptable criterion, the decision was a good one.

Intensive Involvement Leaders

One of the carry-overs to Project R-3 under AB 938 was the use of subject-matter consultants as team leaders for the intensive involvements. On the oceanography involvement under the SB 28 Project R-3, graduate students in marine biology went along. Each consultant was in charge of a team of students; under this arrangement, the teachers were there to supervise the well-being of the students and to observe.

The first intensive involvement under AB 938 also made use of graduate students as team leaders. But the teachers were concerned that the role they were asked to play was that of disciplinarian. They realized that one of the objectives of the intensive involvement was to improve student-teacher relationships. As a result, they requested that on future involvements there be no "outside" leaders and that the project teachers carry out the learning experiences.

The result has been that teachers are now able to interact more freely with their students on the intensive involvements and they have had no difficulty in carrying out the planned activities. They feel strongly that they are able to build throughout the year on the relationships established during the intensive involvements.

## EXTERNAL CHANGES

### The Change in Achievement Tests

When Project R-3 started in the seventh grade in 1970, the decision was made to use the California Achievement Test in reading and math. It had been used in the SB 28 project, and would have provided a good basis for comparison. At the same time it would have answered the question "Can the successful demonstration project be expanded to accommodate a larger, more heterogeneous population?" The CAT was used as both a pre-test and post-test in 1970.

Before the end of the seventh grade, the decision was made that all projects funded under AB 938 would use the California Test of Basic Skills to evaluate achievement gain. The only adverse effect was the loss of longitudinal data. The two tests are sufficiently different that the seventh grade could not be included in the longitudinal achievement analysis.

### Three Principals in Three Years

It will be recalled that Project R-3 started in Woodrow Wilson Junior High School. At the end of the first year (the seventh grade) the principal left and was replaced the following fall. Then, in the third year, the project moved to Lincoln High School for the ninth grade and still a third principal.

There seem to have been no adverse effects on the project. This is probably due to two factors. First, all three principals have been sympathetic to the project and have allowed it to function in their school as a separate project. They have been accommodating in making schedule changes to take care of the needs of project students who are in the main stream of the school for some of their classes. Second, because Project R-3 has its own internal management and budgetary control, they are able to function as a self-contained unit if they are in a welcoming environment. They have been so far.

Moving to Lincoln High School

In order to comply with earthquake regulations established by the Field Act, it was necessary to close several schools in San Jose Unified School District by the spring of 1971. Among the schools that were closed was Woodrow Wilson Junior High. Lincoln, which had been a three-year high school, was converted to a four-year school and took ninth grade students from three junior high schools.

Portable bungalows were put up to house the R-3 students on the campus for the three periods a day they were in the project. It is worthy of mention that the bungalows were not ready in time for the opening of school and room had to be found temporarily for the project to hold classes within the main building. The cooperation of Lincoln staff in helping to make arrangements for the project and sharing classrooms lessened the impact of the unavailability of space. Lincoln's acceptance made the transition for the project an easy one.

## VIII. STAFF OPINION

As has been our practice in previous years, we interview the project staff periodically and solicit their opinions on a variety of project-related subjects. Many of the improvements that have been effected in the project in the past have been a result of suggestions made by the members of the staff.

This year the focus of the interviews was on the aspects of the program that the staff feels are essential to its success. As the program has been described in many publications, its basic structure is well known. Those descriptions to a large extent emphasize specific components and instructional practices such as individualized instruction, the simulation, the small classes with instructional aides, parent involvement, intensive involvements, and heterogeneous grouping.

To another school or district interested in replication, this information is necessary, but it is not sufficient. We thought it important to document the opinions of the teachers and aides who participated in the program as to other information that is essential to replication.

### ORIENTATION TO THE PROGRAM

It is important to fully understand not only the project's stated objectives and operational procedures, but also the atmosphere that is created in the classrooms. The staff would strongly urge anyone considering replication to visit the project and spend considerable time in the classrooms. They are all experienced teachers, and they feel that the general atmosphere in the classroom is impressive. We have visited classrooms, and are inclined to agree. It is a little difficult to describe; perhaps workmanlike is the appropriate adjective. Students take a business-like approach to their tasks. This does not mean that the rooms are unduly quiet; they are not. It does mean that the noise level is conducive to work, but not oppressively quiet.

After seeing the classrooms, visitors should spend some time talking with the teachers and instructional aides, and getting explanations of what they observed.

## DESIRABLE STAFF CAPABILITIES

### The Project Director

Several staff members said that it was important to select a director with good organizational ability. They felt the director should be someone with an administrative background, a willingness to put in long hours, an ability to meet the public and, most important, with extensive classroom experience so that he can understand the problems of the teachers. In addition, the director should be able to establish a good relationship with the members of the staff, and with the rest of the faculty in the school. Finally, the director should have "humane qualities".

### The Teachers

The teachers were unanimous in agreeing that teachers selected for the project should be innovative and extremely adaptable. They should be able to work closely with other staff members in a cooperative effort. Project teachers should be willing to adjust to new roles in the classroom, becoming managers of learning situations rather than imparters of information. They should be ready to try new materials and new techniques of teaching. No matter what subject they teach within the project, they should be familiar with what is taking place in the other components of the project.

### The Instructional Aides

Since its inception the project has involved the aides in the instructional process. They are expected to instruct students in skill areas, work with students on their individual contracts, and answer questions. Selection of such aides requires a careful screening process before they become part of the project, and intensive, continuous in-service training. The teachers themselves provided much

of this training for their own instructional aides. In order to insure that screening is properly done, a job description should be carefully developed.

## CONTINUOUS IN-SERVICE TRAINING

The teachers feel that the in-service training component is an essential part of the project and serves at least two purposes. First, it enables each teacher to have an overall view of the other components of the project and to see the interrelationships among them. Second, it enables the teachers to work together, with guidance when needed, on solving instructional problems as they arise in the project. Many of the innovations described in the section on the evolutionary nature of the project were instituted in direct response to a perceived need. The teachers all feel that the in-service training activities along with the very challenging nature of the program have contributed substantially to their professional growth.

## A MULTI-YEAR PROGRAM

All the staff agreed that implementing a project such as R-3 is not a task to be accomplished in one instructional year. The basic structure provides an excellent point of departure, but it would be unrealistic for a replicating district to expect the smooth-running operation to be achieved in a short time. Each project will have to find its own *modus operandi*; R-3's organizational structure can serve as a guideline, but other districts will want to develop their own ways of building on the basic strengths of the R-3 approach.

## IX. DISSEMINATION AND REPLICATION

The Division of Compensatory Education, California State Department of Education, which administers AB 938 delineates the responsibility of demonstration programs for disseminating information:

> The Division of Compensatory Education views the projects selected for approval as demonstration centers which transcend a limited implementation within the school. The participating schools must serve as demonstration centers which will provide exemplary models for intra and inter district information.*

There are two major aspects of the dissemination process for demonstration projects. The first deals with the dissemination of materials developed for the projects. The second aspect, and more costly in terms of time and resources, concerns the effective hosting of visitors. This means that project visitors are provided with the opportunity not only to observe the project in operation but also to discuss the project with the staff and to exchange--on an open and timely basis--information about problems and their solutions. Other dissemination activities include media presentations, attendance at meetings and the provision of information for general publicity. The dissemination activities for Project R-3 were extensive throughout the year.

### DISSEMINATION OF MATERIALS

Project R-3 responded to over eleven hundred requests for publications in 1971-72. Requests came from curriculum coordinators, superintendents of other school districts, faculty members, principals and school board members in thirty states in addition to California.

---

*Memo by Leo R. Lopez, Associate Superintendent and Chief, Division of Compensatory Education, to Directors of Demonstration Programs in Reading and Mathematics entitled: "Education Code 6490ff--Demonstration Program Information Inquiry Relating to the Demonstration Center Concept, Cost-Effectiveness, Implementation and Dissemination of Information," CE/P 83-71, January 6, 1971.

For the California Compensatory Education Conferences sponsored by the Division of Compensatory Education, California State Department of Education, they prepared a book about the project. In addition to the program description and replication guide, there is a chapter on the theory of gaming and simulation. The book provides the interested teacher with over twenty reproducible games and simulations, each complete with its statement of learning objectives, list of required materials and teacher's guide for its use. Over fourteen hundred books were distributed at the two sections of the conference and thirty others have been sent in response to requests from twenty-two other states. An additional five hundred books were given to participants at conferences where Project R-3 conducted workshops. These figures probably underestimate the number of books distributed because they were often included in packets of materials mailed in response to general requests for information.

In addition to the project's own dissemination activities, it has been widely publicized through other avenues. It has been designated as one of the five models for the national Right to Read program. The project has been written up as an exemplary program by the National Council for Educational Communication, USOE, and the mathematics program has been written up as an exemplary project by the California State Department Task Force for Improvement of Mathematics.

PRESENTATIONS AND WORKSHOPS

The project director and staff made six presentations to a total of about 350 people within San Jose Unified School District.

The project staff not only ran workshops at both sections of the Compensatory Education Conference, but also made presentations to the California Audio-Visual Coordinators Conference at Carmel, and the Right to Read Conference in Washington, D.C. They conducted workshops at the California English Teacher Specialists Workshop at Asilomar. A general presentation was made to about five hundred people at the Loyola University Individualized Mathematics Conference and workshops were conducted for about two hundred and fifty people at that conference.

## PROJECT VISITORS

Numerous visits were made by individuals. Twenty-one groups ranging in size from two to twenty-seven visited the project during the year. Eight of these groups were from out of state and included, among others, members of the Project TREND, USOE, Washington, D.C.; the Ruby, South Carolina Career Education team; Board members and the Assistant Superintendent of Schools, Newark, New Jersey; and the Title I Coordinator from Waynesville, North Carolina.

## REPLICATION

### In San Jose Unified School District

Some teachers in other junior and senior high schools within the district are using some of the reading materials developed by the project and in one school all the math materials are being used by one teacher. Three reading teachers who have left the program but are still in the district are using many of the materials and are putting into operation in their own classrooms many of the R-3 concepts and practices. One former math teacher who moved to a suburb of Portland, Oregon is running his math classes as he did while he was with the project.

R-3 has been used by other faculty members at Lincoln High School as follows:

- Social studies teachers are using the history and government gaming-simulations
- Business teachers are using the gaming-simulations on budgeting, finance, stocks and bonds, and banking
- Consumer finance classes are using gaming-simulations
- Reading teachers used R-3 materials and techniques
- English teachers used R-3 materials
- Math teachers adopted individualized math contracts

R-3 materials are being used in classes held in a special building on the Lincoln campus for neurologically handicapped students.

In Other Districts

Although no other district has made use of the complete R-3 concept of gaming-simulation to reinforce reading and math skills, two districts have used the gaming-simulation component as a daily class period.

Central Point, Oregon ran a pilot program for under-motivated, under-achieving seventh, eighth and ninth graders in the fall of 1970. Reading and math were taught in the conventional fashion. Two teachers taught the gaming-simulation classes. Class size was about 30 in the seventh grade; 24 in the eighth and ninth grades. There was no aide in the project until March, 1971. She was shared by both teachers. The classes were started late in the fall in the eighth and ninth grades and in January for the seventh grade. We have no information on achievement during the course of the project.

The teachers said that it would have been helpful to have had the materials to study during the summer preceding the program.. One teacher would have liked an opportunity to visit R-3 and observe the program in action in San Jose for a few days. Not having an aide made collecting necessary materials and setting up for an activity extremely difficult.

They did not continue the program in 1971-72, but are planning one to start in the Fall of 1972. The school in the meantime has gone to a flexible scheduling arrangement and the possibility of offering R-3 as an elective is being considered.

Wrangell, Alaska was having problems with about twenty-five or thirty under-achieving, under-motivated eighth graders, and the principal of the school visited Project R-3 in the summer of 1971. He was interested in trying a program in his school and later in the summer the prospective teacher visited San Jose. He spent some time talking with the project director and teachers, and then spent considerable time at Technicon going over eighth grade gaming simulation materials with Robert Nelson.

There were about twenty-five students in the Wrangell R-3 program that was implemented during 1971-72. The teacher had an aide throughout the program. Mr. Nelson went to Wrangell in November and provided in-service training for both the teacher and the aide. In addition to providing the R-3 materials prepared for San Jose, Technicon wrote several units for Wrangell that were geared to local industries: lumber, timber, commercial fishing, and tourism. Students were taken to Juneau to study at first-hand some of the occupations they had been introduced to during the year. The intensive involvement trip to Juneau was planned and executed by the school staff. Achievement gains in both reading and math were reported to be better than those normally achieved with students of similar characteristics. Both the R-3 teachers and teachers who had the students in other classes reported a marked improvement in their behavior by the end of the year.

Without further information, we can only speculate about how achievement scores were improved through the use of the gaming-simulation alone. Three possible explanations occur to us. First, the success the students had in completing the R-3 units may have encouraged them in their other classes. Second, it is possible that the additional time spent on reading and math in the gaming-simulation class was helpful to them. Third, as their behavior improved it is possible that their other teachers reacted in more positive ways and the students were encouraged to work harder. These remain hypotheses to be tested if other districts adopt only the gaming-simulation component of R-3.

## X. RECOMMENDATIONS AND SUGGESTIONS

### FACILITATING ACHIEVEMENT GAIN

Our analysis of the achievement gain for 1971-72 leads to the following suggestions:

- The reading teachers should analyze the differences between their program last year and this year, to see if they can isolate the factors that made for better gains in 1971-72.
- The math teachers should make the same kind of analysis in an attempt to explain why their results were less satisfactory this year. Such an analysis could provide strong guidelines for strengthening the program in the future.
- The reading program showed gains of less than a year in Septiles 4, 6, and 7 on the comprehension sub-test, in contrast to gains of a year or better in all other Septiles on Comprehension and all Septiles on the Vocabulary sub-test. The curriculum for these septiles should be reviewed for improvement.
- The math program showed gains of over a year in Septiles 3, 5, 6, and 7 of the Computation sub-test, in Septile 3 of Concepts, and in no septiles on the Application sub-test. We take this as strong evidence that the math program is in need of review and strengthening at all levels.
- The analysis of gains and losses by septile can be used as an additional tool to aid in focusing on weak areas in the programs.

Our analysis of two-year achievement gain based on the achievement idiographs we constructed for both reading and math leads to the following suggestions:

- The idiographs in each subject can be used to measure the progress made by individual students in the project. The records of those who did not achieve at the predicted level of expectancy can be studied intensively, the techniques and materials used with them analyzed for clues as to how their individual programs may be improved. There were 22 such students in reading; 40 in math.
- The idiographs also provide a visual assessment of levels in the curricula that are weak, and of levels where results are well beyond expectancy.

We also suggest that the idiographs can be used by the teachers in counseling with individual students who are not achieving at their expected levels.

Finally, it might be a good idea to intensively study those students who either made essentially no gain in two years, or lost. In addition to analyzing their individual programs, further diagnostic testing might be indicated to pinpoint their problems.

PRIORITIES FOR ADMISSION TO R-3

Because the project is now operating in a high school, the question of grade level becomes subordinate to the question of need. If R-3 continues at Lincoln next year, the school principal and the project director will need to make a series of decisions about which students to accommodate in the program. We take it for granted that all students who have been in the project up until now and are still in need of help, or who wish to continue, will be the first students considered.

In view of the State requirement that students read and do math at the eighth-grade level before they can be graduated from high school, the decision will have to be made about what other students in the school can participate. Budgetary constraints will of course determine the number of students. But within that number, who should they be? Should they be students most in need of remedial help in one or both of the subjects? What grade level, if any, should receive first consideration? Should first consideration be given to students in the twelfth grade who are almost at the eighth grade level and might, with a year's help meet the graduation requirement? We submit this series of questions for the consideration of the school principal and the project director. At the same time, we would like to suggest that intensive in-service training for the faculty members of Lincoln who are not members of the project staff might provide the capability needed to increase the number of students who could participate in an R-3 type of program.

HETEROGENEOUS GROUPING

Heterogeneous grouping has been so successfully implemented that we strongly urge it be continued. In addition to all the benefits that have accrued to students from interacting with other students of differing ability levels, it has been the catalyst for complete individualization of instruction in the project. Allocating students to classroom groups on the basis of their pre-test score (or post-test scores of the previous year) assures an equitable distribution of students. By not having all students of the lowest achievement level together in one class, many problems caused by poor attitude are solved. By putting students of low achievement level in the same class with better achieving students, the former are provided with a model of "the good student" and this association often is the key to starting them on an upward trend of achievement.

We suggest that as Lincoln students who have not previously participated in R-3 are drawn into the program, classroom allocations take this into account, so that there is a nucleus of former R-3 students in each classroom who can help orient new students. If R-3 is used as a remedial reading program throughout Lincoln it would be advisable to have a spread of achievement level in the classes. For the students with the severest reading problems, those with lesser problems would be a motivating example. It would also insure that each student is working on a continuous progress program specifically designed for him.

HOME VISITS

One of the very strong non-instructional components of the project has been the home visitation program. It has gained momentum over the years because the persisting interest of the project staff in their students has affected the parents. Many of them are experiencing for the first time a visit from a teacher that is not prompted because their child is in trouble. As the program has continued, many parents who were reticent at first have begun to discuss their children freely with the teachers, and a cooperative effort is now in progress. We recommend that the component be kept.

It would be inexpedient, at a time when schools are trying to actively involve the community in their affairs, to discontinue the home visits. This is community involvement at a very meaningful level, where on an individual basis in the privacy of their homes, parents and teacher can communicate their mutual concern for a student.

## IN-SERVICE TRAINING

Project R-3 has evolved a workable and productive in-service training component. Because it has been highly flexible, the staff has been able to use it effectively in immediately responding to perceived weaknesses or needs in all aspects of the project.

Our recommendation is that the same structure be maintained in the future, and the same intensity of effort devoted to the in-service training component. We would also recommend that, as feasible, it be extended to include other faculty members of Lincoln so that there may be even more carry-over of R-3 techniques and materials to the rest of the school.

## INTENSIVE INVOLVEMENTS

When budgetary constraints were not severe, i.e., in the SB 28 demonstration project where the idea of intensive involvements originated, it was possible to have two involvements a year. This enabled both objectives of the involvements to be met: establishing good staff-student relationships early in the year and providing an intensive learning situation that could capitalize on new learnings acquired throughout the instructional year.

The staff really needs to consider a series of questions, answers to which will provide a solution to the problem of when to have an intensive involvement, given budgetary constraints that preclude two a year.

o Which objective do they wish to further?

If the involvement is intended to establish good staff-student relationships, then early in the year would be the logical time. If

additional Lincoln students are to be involved in the project, an early involvement would also help to establish a good relationship between students who have previously participated in the project and newcomers to the project.

If the involvement is intended to provide an intensive learning experience that builds on new skills and learnings, then the time to have it is toward the end of the instructional year.

- Is there a trade-off between an intensive involvement and a series of one-day field trips?

Again because of budgetary constraints, project staff may want to give some consideration to whether, given the nature of the students and the theme of next year's curriculum, a series of field trips to constantly reinforce the R-3 component might serve their objectives better than an intensive involvement?

Without making a recommendation, we present these suggestions for a framework within which to make a decision about the intensive involvement. The decision should be made by the responsible administrators.

## INSTRUCTIONAL AIDES

When Project R-3 started in the seventh grade, a set of qualifications was specified for the instructional aide position. At that time, only a small percentage of the students were not in need of remedial help. Now, there are many students at grade level, and a sizable number well above grade level.

It may be time to reconsider the qualifications desirable in an instructional aide in high school. There is a strong likelihood that some of the aides who did an excellent job of helping the students at the lowest achievement levels are not capable of giving the help to the students achieving above grade level. Perhaps more stress needs to be put on their academic qualifications.

PROJECT MANAGEMENT

After many discussions with the project director, it is evident that R-3 has achieved a smooth-running operation. Many of the problems of the first two years have been solved, and former problem situations are now routine operations.

It may be time to consider a change in the mix of skills necessary to insure continued growth for the students. We suggest that the project director give thought to having on his staff a curriculum specialist who can act as a resource to the teachers, and can take an active role in curriculum improvement. It is obvious that the curriculum as devised for the individual progress of students is of paramount importance. Such a specialist could also play an important role in assuring the quality of the educational product developed by an outside contractor.